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ently conflicting theories. The purpose of this paper is to show that these contributions not only do not conflict, but that all of them are essential parts of a picture, which is nearer completion than most of us realize. The main contributions may be summarized as follows:

Ritz showed that by assuming the nucleus to be magnetic, so that the force determining the vibration of the electron depends on the velocity instead of the position of the electron, one obtains a frequency law involving only the first power of the frequency, in accordance with observations.

The essential part of Bohr's beautiful theory is the mechanism by which he accounts for Ritz's combination principle namely, that the frequency of radiation depends not on where the electron is, or where it came from, but upon both.

J. J. Thomson added the idea that Bohr's stable orbits, and the quantum relations connected with them, are due to a skeleton structure of the nucleus and not to any discontinuity of energy.

Sommerfeld extended Bohr's theory to atoms of higher atomic weight, and has drawn a beautiful picture. His main contribution is the idea that the orbit may be either a circle or an ellipse of definite eccentricity, which accounts with extreme precision for the separation of doublets both in X-ray spectra and the hydrogen spectrum.

Langmuir showed that all known chemical properties are satisfied by an atom with relatively stationary electrons, arranged in concentric shells about the nucleus.

By combining these contributions, namely, the magnetic nucleus of Ritz, Bohr's stable orbits, Thomson's skeleton nucleus, Sommerfeld's elliptical orbits, and Langmuir's stationary electrons, we arrive at a composite picture which represents our present knowledge remarkably well. The rotating point electron is replaced by a ring-shaped electron. The constant angular momentum of the rotating electron is replaced by constant magnetic moment of the ring. In the case of hydrogen and ionized helium the ring sur-

rounds the nucleus, and the picture is identical with Bohr's. In the case of the other elements the rings lie on the surface of concentric shells, in positions corresponding to Langmuir's cells. The condition of constant angular momentum of each ring electron holds for all atoms, and Sommerfeld's picture of the circular and elliptical rings is applied to the shape of the ring electron.

The discussion following the symposium was of necessity brief. Emphasis was given to the clear advantage of preferring a theory of atomic structure that gives correct quantitative results.

G. W. STEWART,
Secretary Section B

SCIENTIFIC EVENTS

PUBLICATIONS AND MEMBERSHIP OF THE NATIONAL ACADEMY OF SCIENCES

At the recent meeting of the academy the home secretary presented the following report:

THE PRESIDENT OF THE NATIONAL ACADEMY OF SCIENCES.

Sir: I have the honor to present the following report on the publications and membership of the National Academy of Sciences for the year ending April 26, 1920.

Two parts of Volume 14 of the *Memoirs of the National Academy of Sciences* have been completed and distributed: the second memoir, "Complete Classification of Triad Systems," by H. S. White, F. N. Cole and L. D. Cummings, and the fourth memoir, "Minor Constituents of Meteorites," by G. P. Merrill.

The third memoir, "Tables of Minor Planets," by A. O. Leuschner, A. E. Glancy, and S. H. Levy, and the fifth and final memoir of Volume 14, "Tables of the Exponential Function," by C. E. Van Orstrand, are now in page proof and will be issued shortly, as will also Volume 15, "Psychological Examining in the United States Army," by Robert M. Yerkes.

Volume 16, first memoir, "Lower California and its Natural Resources," by E. W. Nelson, and the second memoir, "Studies upon the Life Cycles of Bacteria," by F. Löhnis, are now in galley proof. The third memoir, "A Recalculation of Atomic Weights," by F. W. Clarke, is now in the hands of the printer.

Volume VIII. of the *Biographical Memoirs* has been completed with the publication of the biog-

ographies of Benjamin Osgood Peirce, and Cleveland Abbe, and the bound volume distributed. The following biographies forming a part of Volume IX. have been completed and distributed: William Bullock Clark by John M. Clarke; Arnold Hague by Joseph P. Iddings; Eugene Waldemar Hilgard by Frederic Slate; James Dwight Dana, by L. V. Pirsson; James Mason Crafts, by Charles R. Cross; Lewis Boss, by Benjamin Boss, and Alpheus Spring Packard, by T. D. A. Cockerell. That of Charles Sedgwick Minot is now in page proof.

The Report of the National Academy of Sciences has been issued and the fourth Annual Report of the National Research Council will be issued in separate form in a few days. The Proceedings have reached the third number of the sixth volume.

Since the last meeting, two members have died. Louis V. Pirsson, elected 1913, died December 8, 1919, and Horatio C. Wood, elected in 1879, died in 1919. This leaves an active membership of 175 members, 1 honorary member and 31 foreign associates. Gustav Retzius, foreign associate, died on July 12, 1919.

C. G. ABBOT,
Home Secretary

MATHEMATICAL MEETINGS AT THE UNIVERSITY OF CHICAGO

THE twenty-seventh summer meeting and ninth colloquium of the American Mathematical Society will be held at the University of Chicago during the week beginning Monday, September 6, 1920. The sessions of the Mathematical Association of America will occupy Monday morning and afternoon. The council of the society will meet on Monday evening. The regular sessions of the society will occupy Tuesday morning and afternoon and Wednesday morning. The joint dinner of the society and the association will be held on Tuesday evening.

The University of Chicago will open two of its dormitories, one for men and one for women, during the week of the meeting, and meals will be provided on the university grounds. Advance information on these matters can be obtained from Professor H. E. Slaught.

The colloquium will open Wednesday afternoon and will extend through Saturday morning. It will consist of two courses of five lectures each, as follows: I. Professor G. D.

Birkhoff, of Harvard University: "Dynamical systems." The last forty years have witnessed fundamental advances in the theory of dynamical systems, achieved by Hill, Poincaré, Levi-Civita, Sundman, and others. The lectures will expound the general principles underlying these advances, and will point out their application to the problem of three bodies as well as their significance for general scientific thought. The following topics will be treated: Physical, formal, and computational aspects of dynamical systems. Types of motions such as periodic and recurrent motions, and motions asymptotic to them. Interrelation of types of motion with particular reference to integrability and stability. The problem of three bodies and its extension. The significance of dynamical systems for general scientific thought.

II. Professor F. R. Moulton, of the University of Chicago: "Certain topics in functions of infinitely many variables." I. On the definition and some general properties of functions of infinitely many variables. II. On infinite systems of linear equations. III. Infinite systems of implicit functions. IV. Infinite system of differential equations. V. Applications to physical problems.

THE SOUTHWESTERN DIVISION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

A MEETING of the council of the American Association for the Advancement of Science, held in Washington on April 26, approved the organization of the Southwestern Division of the Association, which was tentatively made in a meeting of delegates held at the University of Arizona, Tucson, Arizona, on Saturday, April 10.

At that meeting Dr. D. T. MacDougal was delegate from the American Association. Local delegates came from Prescott, Phoenix, and Tucson, Arizona Albuquerque, New Mexico and El Paso, Texas.

Dr. Edgar L. Hewett, of the School of American Research, director of the Archaeological Institute, director of the State Museum at Santa Fe, N. M., and the Archaeo-